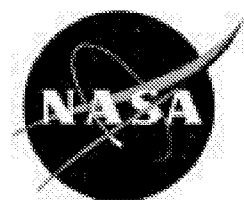


NASA/SP—2000-7011/SUPPL503
August 2000

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES



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51	Life Sciences (General)	1
	Includes general research topics related to plant and animal biology (non-human); ecology; microbiology; and also the origin, development, structure, and maintenance, of animals and plants in space and related environmental conditions. For specific topics in life sciences see <i>categories 52 through 55</i> .	
52	Aerospace Medicine	2
	Includes the biological and physiological effects of atmospheric and space flight (weightlessness, space radiation, acceleration, and altitude stress) on the human being; and the prevention of adverse effects on those environments. For psychological and behavioral effects of aerospace environments see <i>53 Behavioral Sciences</i> . For the effects of space on animals and plants see <i>51 Life Sciences</i> .	
53	Behavioral Sciences	11
	Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.	
54	Man/System Technology and Life Support	13
	Includes human factors engineering; bionics, man-machine, life support, space suits and protective clothing. For related information <i>52 Aerospace Medicine</i> .	
55	Exobiology	15
	Includes astrobiology; planetary biology; and extraterrestrial life. For the biological effects of aerospace environments on humans see <i>52 Aerospace Medicine</i> ; on animals and plants see <i>51 Life Sciences</i> . For psychological and behavioral effects of aerospace environments see <i>53 Behavioral Sciences</i> .	

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Typical Report Citation and Abstract

- ❶ 19970001126 NASA Langley Research Center, Hampton, VA USA
- ❷ Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes
- ❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
- ❹ Mar. 1996; 130p; In English
- ❺ Contract(s)/Grant(s): RTOP 505-68-70-04
- ❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
- ❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10° to 50°, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65° swept forebody serrations tended to roll together, while vortices from 40° swept serrations were more effective in generating additional lift caused by their more independent nature.
- ❽ Author
- ❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 503)

AUGUST 2000

51

LIFE SCIENCES (GENERAL)

Includes general research topics related to plant and animal biology (non-human); ecology; microbiology; and also the origin, development, structure, and maintenance, of animals and plants in space and related environmental conditions. For specific topics in life sciences see categories 52 through 55.

20000070749 Arrowhead Space and Telecommunications, Inc., Falls Church, VA USA

Bus Driver Fatigue and Stress Issues Study *Final Report*

Dec. 08, 1999; 120p; In English

Contract(s)/Grant(s): DTGH61-99-Z-00027

Report No.(s): PB2000-106445; No Copyright; Avail: CASI; A02, Microfiche; A06, Hardcopy

Arrowhead Space and Telecommunications, Inc. conducted a research project to identify unique aspects of operations within the motorcoach industry which may produce bus driver fatigue and stress. Funding for and oversight of the study was provided by the Federal Highway Administration (FHWA), Office of Motor Carriers (OMC). The purpose of this study is to (1) identify from direct interaction with motorcoach owners, safety directors, operations managers, and drivers those fatigue-inducing stresses which they believe are unique to the motorcoach industry; (2) evaluate the relative influence of these stresses on bus driver fatigue; (3) provide relevant feedback to the FHWA/OMC for its use in future decisions which will affect the motorcoach industry; and (4) develop an outreach video to help motorcoach drivers understand the effects of fatigue, the stresses that induce it, and means to reduce it.

NTIS

Safety; Stress (Physiology); Fatigue (Biology); Human Performance

20000073285 Massachusetts Inst. of Tech., Dept. of Nuclear Engineering, Cambridge, MA USA

The Behavior of Uranium in the Environment: Bacterial Reduction of an Aqueous Uranium Species

Lewis, Matthew R.; Jun. 2000; 382p; In English

Report No.(s): AD-A377425; No Copyright; Avail: CASI; A17, Hardcopy; A03, Microfiche

Experimental and analytical studies were performed to investigate the behavior of uranium with bacteria in an anaerobic environment. Laboratory studies used *Shewanella putrefaciens* because of its ability to grow rapidly in aerobic conditions and reduce metals in anaerobic conditions. Under anaerobic conditions, *Shewanella putrefaciens* use aqueous uranium as the electron acceptor in lieu of oxygen. The reduction of U(VI) to U(IV) removes uranium from solution and forms an insoluble compound known as uraninite. Ultraviolet/Visible Spectroscopy was used to analyze uranium ion complexation with several oxazine dyes that included Brilliant Cresyl Blue, Celestine Blue, and Gallomine Triethiodide. Complexion and resultant color changes with U(VI) and U(IV) with the dye solutions were tested at a variety of pH levels. The dye behavior was evaluated for future use as a visible reduction indicator for microbial reduction when performing direct plating experiments. These studies showed the best visual indicator to be Celestine Blue. Significant absorbance changes in the 400 to 800 nm wavelength range for Brilliant Cresyl Blue and Gallomine Triethiodide solutions were not detected. X Ray Diffraction and Electron Microprobe Spectroscopy characterized the solid precipitates by the bacteria. The dark black precipitate exhibited visible characteristics of both UO₂(s) and U₃O₈(s). Electron microprobe showed a very small crystal formed by the bacteria, but was inconclusive with respect to the elemental composition of the mineral. The XRD spectra determined that precipitate was uranium dioxide UO₂(s). The investigation included a time phased uranium isotope analysis in the precipitate and supernatant samples. Thermal Ionization Mass Spectrometry (TIMS) measured the uranium isotopic ratio of U-238/U-235 to determine if microbial reduction of U(VI) to U(IV) affected these ratios.

DTIC

Uranium; Bacteria; Ultraviolet Spectroscopy; Microorganisms; Aerobes; Uranium Isotopes

20000074288 National Agency for Medicines, Helsinki, Finland

Phototherapy appliances, their ultraviolet radiation and quality assurance of phototherapy

Huurto, L.; Leszczynski, K.; Visuri, R.; Ylianttila, L.; Jokela, K.; Dec. 31, 1998; 69p; In Finnish

Report No.(s): DE99-636794; LL-JULK-4/1998; ISBN 952-5099-22-9; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

Artificial UV radiation (UVR) is used in the treatment of psoriasis and other skin diseases. Long term phototherapy is associated to increased risk of squamous cell carcinoma. This report gives a short review of biological effects of UVR and technical aspects of phototherapy units. The phototherapy units used in Finnish Central hospitals are described and the measured UVR dose rates of these units are presented. In addition, the UVR meters used in hospitals are described and the calibration factors are given for UVR dose rate measurements. Finally, recommendations are given for the quality assurance of phototherapy units as well as for assessing UVR doses of patients.

NTIS

Therapy; Ultraviolet Radiation; Quality Control

20000080159 NASA Ames Research Center, Moffett Field, CA USA

Body Temperatures During Exercise in Deconditioned Dogs: Effect of NaCl and Glucose Infusion

Greenleaf, J. E., NASA Ames Research Center, USA; Kruk, B., NASA Ames Research Center, USA; Nazar, K., NASA Ames Research Center, USA; Kaciuba-Usciko, H., NASA Ames Research Center, USA; [2000]; 1p; In English; No Copyright; Avail: Issuing Activity; Abstract Only

Infusion of glucose (Glu) into normal exercising dogs attenuates the rise in rectal temperature (Delta-Tre) when compared with delta-Tre during FFA infusion or no infusion. Rates of rise and delta-Tre levels are higher during exercise after confinement. Therefore, the purpose of this study was to determine if Glu infusion would attenuate the exercise-induced excess hyperthermia after deconditioning. Rectal and quadriceps femoris muscle temperatures (Tmu) were measured in 7 male, mongrel dogs (19.6 +/- SD 3.0 kg) during 90 minutes of treadmill exercise (3.1 +/-SD 0.2 W/kg) with infusion (30ml/min/kg) of 40% Glu or 0.9% NaCl before BC and after confinement (AC) in cages (40 x 110 x 80 cm) for 8 wk. Mean (+/-SE body wt. were 19.6 +/- 1.1 kg BC and 19.5 +/- 1.1kg AC, exercise VO2 were not different (40.0 - 42.0 ml/min/kg-1). With NaCl AC, NaCl BC, GluAC, and GluBC: Delta-Tre were, 1.8, 1.4, 1.3 and 0.9C respectively; and Delta-Tmu were 2.3, 1.9, 1.6, and 1.4C. respectively (Pis less than 0.05 from GluBC). Compared with NaCl infusion, attenuated both Delta-Tre and Delta-Tmu BC and AC, respectively. Compared with GluBC, GluAC attenuated Delta-Tmu but not Delta-Tre. Thus, with similar heat production, the mechanism for attenuation at bad body temperature with Glu infusion must affect avenues of heat dissipation.

Author

Body Temperature; Dogs; Hyperthermia; Physical Exercise; Thermoregulation; Sodium Chlorides; Glucose

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AEROSPACE MEDICINE

Includes the biological and physiological effects of atmospheric and space flight (weightlessness, space radiation, acceleration, and altitude stress) on the human being; and the prevention of adverse effects on those environments. For psychological and behavioral effects of aerospace environments see 53 Behavioral Science. For the effects of space on animals and plants see 51 Life Sciences.

20000070677 Kyoto Prefectural Univ., Dept. of Physiology, Kyoto, Japan

Effect of an Exercise-Heat Acclimation Program on Body Fluid Regulatory Responses to Dehydration in Older Men

Takamata, Akira, Kyoto Prefectural Univ., Japan; Ito, Tomoyuki, Kyoto Prefectural Univ., Japan; Yaegashi, Kazuhiro, Kyoto Prefectural Univ., Japan; Takamiya, Hisatake, Kyoto Prefectural Univ., Japan; Maegawa, Yasuyo, Kyoto Prefectural Univ., Japan; Itoh, Toshiyuki, Kyoto Prefectural Univ., Japan; Greenleaf, John E., Kyoto Prefectural Univ., Japan; Morimoto, Taketoshi, Kyoto Prefectural Univ., Japan; American Journal of Physiology; 1999; ISSN 0363-6119; Volume 277, No. 4, pp. R1041-R1050; In English; Sponsored in part from the Foundation of Total Health Promotion; Copyright; Avail: Issuing Activity

Effect of an exercise-heat acclimation program on body fluid regulatory response to dehydration in older men. We examined if an exercise-heat acclimation program improves body fluid regulatory function in older subjects, as has, been reported in younger subjects. Nine older (Old; 70 plus or minus 3 yr) and six younger (Young; 25 plus or minus 3 yr) male subjects participated in the study. Body fluid regulatory responses to an acute thermal dehydration challenge were examined before and after the 6-day acclimation session. Acute dehydration was produced by intermittent light exercise [4 bouts of 20-min exercise at 40% peak rate of oxygen consumption VO2 peak] separated by 10 min rest in the heat (36 C; 40% relative humidity) followed by 30 min of recovery without fluid intake at 25 C. During the 2-h rehydration period the subjects drank a carbohydrate-electrolyte solution

ad libitum. In the preacclimation test, the Old lost approximately 0.8 kg during dehydration and recovered 31 plus or minus 4% of that loss during rehydration, whereas the Young lost approximately 1.2 kg and recovered 56 plus or minus 8% (P less than 0.05, Young vs. Old). During the 6-day heat acclimation period all subjects performed the same exercise-heat exposure as in the dehydration period. Exercise-heat exposure as in the dehydration period. Exercise-heat acclimation increased plasma volume by approximately 5% (P less than 0.05) in Young subjects but not in Old. The body fluid loss during dehydration in the postacclimation test was similar to that in the preacclimation in Young and Old. The fractional recovery of lost fluid volume during rehydration increased in Young (by 80 plus or minus 9%; P less than 0.05) but not in Old (by only 34 plus or minus 5%; NS). The improved recovery from dehydration in Young was mainly due to increased fluid intake with a small increase in the fluid retention fraction. The greater involuntary dehydration (greater fluid deficit) in Old was accompanied by reduced plasma vasopressin and aldosterone concentrations, renin activity, and subjective thirst rating (P less than 0.05, Young vs. Old). Thus older people have reduced ability to facilitate body fluid regulatory function by exercise-heat acclimation, which might be involved in attenuation of the acclimation-induced increase in body fluid volume.

Author

Body Fluids; Dehydration; Males; Physical Exercise; Heat Acclimatization

20000070843 Northeastern Forest Experiment Station, Forestry Sciences Lab., Delaware, OH USA

Ultraviolet Radiation, Human Health and the Urban Forest *Final Report*

Heisler, G. M.; Grant, R. H.; 2000; 44p; In English

Report No.(s): PB2000-104066; FSGTR-NE-268; NEFES/00-3; No Copyright; Avail: National Technical Information Service (NTIS)

Excess exposure to ultraviolet (UV) radiation from the sun, particularly the ultraviolet B (UVB) portion, has been definitely linked with adverse effects on human health, including inducement of skin cancers and eye diseases. Trees may prevent even greater disease rates in humans by reducing UV exposure. Trees greatly reduce UV irradiance in their shade when they obscure both the sun and sky. However, at locations where trees obscure the sun but leave much of the sky in view, UV radiation is much more prevalent than is suggested by the appearance of the visible shadow. Recent measurements of leaf optical properties and algorithms describing sky-radiance distributions will provide information for generating computer models of the effect of trees on UV radiation. These models will be useful in estimating the climatology of UV irradiance in urban areas with trees and buildings, and will aid epidemiological studies and in preparing illustrations of shade patterns for use in public education programs.

NTIS

Forests; Ultraviolet Radiation; Health Physics; Cities; Exposure

20000070857 NASA Ames Research Center, Moffett Field, CA USA

Intensive Exercise Training During Bed Rest Attenuates Deconditioning

Greenleaf, John E., NASA Ames Research Center, USA; Medicine and Science in Sports and Exercise; 1997; ISSN 0195-9131, pp. 207-215; In English

Contract(s)/Grant(s): NAG2-410; MRDC-3A161101A-91C; RTOP 199-21-12; RTOP 199-22-12; RTOP 199-22-22; RTOP 199-22-32; Copyright; Avail: Issuing Activity

Intensive exercise training during bed rest attenuates deconditioning. Med. Sci. Sports Exerc., Vol. 29, No. 2, pp. 207-215, 1997. A 30-d 6 deg head-down bed rest project was conducted to evaluate variable high-intensity, short-duration, isotonic cycle ergometer exercise (ITE) training and high-intensity intermittent resistive isokinetic exercise (IKE) training regimens designed to maintain peak VO₂ and muscle mass, strength, and endurance at ambulatory control levels throughout prolonged bed rest. Other elements of the deconditioning (adaptive) syndrome, such as proprioception, psychological performance, hypovolemia, water balance, body composition, and orthostatic tolerance, were also measured. Major findings are summarized in this paper. Compared with response during bed rest of the no exercise (NOE) control group: the ITE training regimen (a) maintained work capacity (peak VO₂), (b) maintained plasma and red cell volumes, (c) induced positive body water balance, (d) decreased quality of sleep and mental concentration, and (e) had no effect on the decrease in orthostatic tolerance; the IKE training regimen (f) attenuated the decrease in peak VO₂ by 50%, (g) attenuated loss of red cell volume by 40% but had no effect on loss of plasma volume, (b) induced positive body water balance, (i) had no adverse effect on quality of sleep or concentration, and (l) had no effect on the decrease in orthostatic tolerance. These findings suggest that various elements of the deconditioning syndrome can be manipulated by duration and intensity of ITE or IKE training regimens and that several different training protocols will be required to maintain or restore physiological and psychological performance of individuals confined to prolonged bed rest.

Author

Physical Exercise; Deconditioning; Education; Orthostatic Tolerance; Physiology; Sleep; Bed Rest

20000072498 Defence Science and Technology Organisation, Melbourne Australia
Support For International Conference on Physiological and Cognitive Performance In Extreme Environments *Final Report*

Lau, Tony; Jul. 2000; 230p; In English

Contract(s)/Grant(s): DAMD17-00-1-0059

Report No.(s): AD-A377296; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

The proceedings for the International Conference on Physiological and Cognitive Performance in Extreme Environments is presented.

DTIC

Conferences; Mental Performance; Physiology; Cognition; Fatigue (Biology)

20000073250 Army Research Inst. of Environmental Medicine, Natick, MA USA

Effect of Smoking on Cutaneous Vascular Responses to Exercise in Healthy, Exercise-Trained, Heat-Acclimated Humans

Stephenson, Lou A.; Mair, Brent S.; Boulant, Catherine G.; Staab, Janet; Kesick, Christina M.; May 2000; 24p; In English

Report No.(s): AD-A377808; USARIEM-T00-19; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this study was to examine vascular responses to exercise in individuals with a risk factor for atherogenesis compared to individuals who did not share that particular risk. It was hypothesized that smokers (S; n=4) had less compliant cutaneous vessels than nonsmokers (NS; n=4). Esophageal (Tes) and skin temperatures (Tsk), heart rate (HR), blood pressure, forearm skin blood flow (SkBF) and forearm blood flow (FBF) were measured at rest, during 30 min cycle exercise (60% peak aerobic power), following arterial occlusion (reactive hyperemia) and during recovery at 30 degrees Centigrade. Tes, Tsk and FBF were not different between S and NS at rest, during exercise or recovery. HR was higher in smokers at rest (S =69+9; NS=58+5 bpm; p=0.05) and during recovery (S=90+10; NS=75+10 bpm; p=0.07), but not different during exercise. During hyperemia, cutaneous vascular conductance (SkBF/MAP) averaged 3.5 ml/100 ml/min/Torr lower in S than NS (p=0.03). Thermoregulatory responses were not compromised during the 30-min exercise in a warm environment. However, during recovery, HR was increased and reactive hyperemia was decreased in smokers.

DTIC

Physical Exercise; Cardiovascular System; Physiological Responses; Human Beings; Heat Acclimatization; Nicotine

20000073312 Army Research Inst. of Environmental Medicine, Military Performance Div., Natick, MA USA

Physiologic and Pathologic Responses to Heat Stress

Wenger, C. B.; Oct. 1998; 16p; In English

Report No.(s): AD-A377503; MISC-99-3; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The most important responses in humans for removing heat from the body are sweating, which increases heat loss by evaporation, and cutaneous vasodilation, which increases skin blood flow and heat transfer from core to skin. Intense exercise can increase heat production within the body ten-fold or more. For the first few minutes of exercise, most of the heat produced is retained within the body, raising core temperature until it elicits heat-dissipating responses sufficient to eliminate heat as fast as it is produced. Because of the levels of skin blood flow needed for high rates of heat dissipation in a hot environment exercise and heat dissipation make competing demands on the cardiovascular system. In addition, if water and electrolytes lost as sweat are not replaced, plasma volume eventually is depleted, thus reducing central blood volume and impairing cardiac filling. Through these mechanisms, secondary effects of the thermoregulatory responses contribute to many of the adverse effects of heat stress, though other mechanisms related to high core temperature also have a role, especially in heat stroke. Heat tolerance is increased by aerobic exercise conditioning and by acclimatization to heat. Conversely, poor physical fitness and certain disease states and drugs are associated with impairment of the thermoregulatory responses. The foregoing factors account for most of the inter-individual differences in heat tolerance associated with gender and age.

DTIC

Body Temperature; Heat Tolerance; Physical Fitness; Pathology; Physiological Effects; Skin (Anatomy); High Temperature Environments; Physical Exercise; Physiological Responses; Heat Acclimatization; Thermoregulation

20000073315 Army Research Inst. of Environmental Medicine, Natick, MA USA

Exercise and Core Temperature

Wenger, C. B.; Mar. 1999; 25p; In English

Report No.(s): AD-A377492; MISC-99-6; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In humans the most important responses for removing heat from the body are sweating, which increases heat loss by evaporation, and cutaneous vasodilation, which increases skin blood flow and heat transfer from core to skin. Vigorous exercise

can increase heat production within the body ten-fold or more. During the first few minutes of exercise, most of the heat produced is retained within the body, raising core temperature until it elicits heat-dissipating responses sufficient to eliminate heat as fast as it is produced. The steady-state increase in core temperature is proportional to the rate of heat production and, within certain limits, independent of environmental conditions. Because of the levels of skin blood flow needed for high rates of heat dissipation in a hot environment, exercise and heat dissipation make competing demands on the cardiovascular system. Moreover, if water and electrolytes lost as sweat are not replaced, plasma volume eventually is depleted, thus reducing central blood volume and impairing cardiac filling. Through these mechanisms, secondary effects of the thermoregulatory responses contribute to many of the adverse effects of heat stress, though other mechanisms related to high core temperature also have a role, especially in heat stroke. Heat tolerance is increased by aerobic exercise conditioning and by acclimatization to heat. Conversely, poor physical fitness and certain disease states and drugs are associated with impairment of the thermoregulatory responses. The foregoing factors account for most of the inter-individual differences in heat tolerance associated with gender and age. Because of the high rates of heat production, heat-related illnesses are much more likely during exercise than is hypothermia. However, hypothermia may occur during prolonged exercise due to inadequate clothing, changes in the weather, or fatigue or musculoskeletal injury which reduces the level of exercise that can be sustained.

DTIC

Physical Exercise; Body Temperature; Heat Tolerance; Blood Circulation; Physical Fitness; Sweat; Heat Acclimatization; Physiological Effects; High Temperature Environments; Physiological Responses; Thermoregulation

20000073392 NASA Ames Research Center, Moffett Field, CA USA

Neuroendocrine and Immune System Responses with Spaceflights

Tipton, Charles M., NASA Ames Research Center, USA; Greenleaf, John E., NASA Ames Research Center, USA; Jackson, Catherine G. R., NASA Ames Research Center, USA; *Medicine and Science in Sports and Exercise*; 1996; ISSN 0195-9131, pp. 988-998; In English; Copyright; Avail: Issuing Activity

Despite the fact that the first human was in space during 1961 and individuals have existed in a microgravity environment for more than a year, there are limited spaceflight data available on the responses of the neuroendocrine and immune systems. Because of mutual interactions between these respective integrative systems, it is inappropriate to assume that the responses of one have no impact on functions of the other. Blood and plasma volume consistently decrease with spaceflight; hence, blood endocrine and immune constituents will be modified by both gravitational and measurement influences. The majority of the in-flight data relates to endocrine responses that influence fluids and electrolytes during the first month in space. Adrenocorticotropin (ACTH), aldo-sterone, and anti-diuretic hormone (ADH) appear to be elevated with little change in the atrial natriuretic peptides (ANP). Flight results longer than 60 d show increased ADH variability with elevations in angiotensin and cortisol. Although post-flight results are influenced by reentry and recovery events, ACTH and ADH appear to be consistently elevated with variable results being reported for the other hormones. Limited in-flight data on insulin and growth hormone levels suggest they are not elevated to counteract the loss in muscle mass. Post-flight results from short- and long-term flights indicate that thyroxine and insulin are increased while growth hormone exhibits minimal change. In-flight parathyroid hormone (PTH) levels are variable for several weeks after which they remain elevated. Post-flight PTH was increased on missions that lasted either 7 or 237 d, whereas calcitonin concentrations were increased after 1 wk but decreased after longer flights. Leukocytes are elevated in flights of various durations because of an increase in neutrophils. The majority of post-flight data indicates immunoglobulin concentrations are not significantly changed from pre-flight measurements. However, the numbers of T-lymphocytes and natural killer cells are decreased with post-flight conditions. of the lymphokines, interleukin-2 production, lymphocyte responsiveness, and the activity of natural killer cells are consistently reduced post-flight. Limited head-down tilt (HDT) data suggest it is an effective simulation model for microgravity investigations. Neuroendocrine and pharmacological countermeasures are virtually nonexistent and should become high priority items for future research. Although exercise has the potential to be an effective countermeasure for various neuroendocrine-immune responses in microgravity, this concept must be tested before flights to Mars are scheduled.

Author

Blood Plasma; Countermeasures; Endocrine Systems; Hypokinesia; Immune Systems; In-Flight Monitoring; Measuring Instruments; Microgravity; Physiological Responses

20000073801 Energia Nucleare e Delle Energie Alternative, Centro Ricerche 'Ezio Clementel, Bologna, Italy

Bico 2: second national intercomparison campaign of WBC centres working in Italy

Castellani, C. M.; Battisti, P.; Tarroni, G.; Dec. 31, 1998; 66p; In Italian; In English

Report No.(s): DE99-722875; ENEA-RT-AMB-98-11; No Copyright; Avail: Department of Energy Information Bridge

During the period November 1994 - May 1995 the coordinating group of WBC centres working in Italy organized the 2. national intercalibration and intercomparison campaign. A BOMAB phantom was used filled with four radionuclides gel solution with gamma energy emissions ranging between 100 keV and 2 MeV. 17 out of 21 Italian WBC centres took part in the campaign. Through the intercalibration, organized according to internationally accepted methodologies, each WBC centre could check its own calibration procedures. many intermediate data, collected for the methodologies and measurement procedures intercomparison, permitted analyses and comparison of uncertainly causes in a WBC measurement of the internal contamination. A proposal of MDA definition and assessment procedure resulted from the intercomparison campaign.

NTIS

Contamination; Radiation Detectors; Aerospace Medicine

20000073802 Energia Nucleare e Delle Energie Alternative, Centro Ricerche 'Ezio Clementel, Bologna, Italy

Valdose program: methodologies for dose assessment in internal contamination, 1997 census

Castellani, C. M.; Battisti, P.; Tarroni, G.; Dec. 31, 1998; 31p; In Italian; In English

Report No.(s): DE99-722874; ENEA-RT-AMB-98-10; No Copyright; Avail: Department of Energy Information Bridge

Dose assessment in internal dosimetry needs computational and interpretative tools that allow carrying out, as a first step, an evaluation of intake on the base of bioassay measurements or WBC measurements, and as a second step, dose evaluation on the base of estimated intake. In the frame of the MIDIA Co-ordination (WBC operating in Italy), in the first months of 1997 a census on methodologies for dose evaluation in internal contamination has been proposed. A technical form has been sent to all the WBC Centres allowing an accurate description of modalities used in each centre. 9 out of 17 centres sent the answers to the technical form in time. In this paper all the forms filled in are reported. A careful comparative evaluation of the answers has been made both for routine monitoring and for special monitoring. The various radionuclides present in the Italian reality, calculation methodologies both for intake and dose, hypotheses adopted for date, path and modalities of contaminations are also presented. Proposals for conforming to the methodology in Italy after the introduction of the models following ICRP 60 publication that are the base of the Euratom 96/29 Directive are also discussed.

NTIS

Dosage; Contamination; Software Development Tools; Aerospace Medicine

20000074644 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA

Multimode-Optical-Fiber Imaging Probe

Jackson, Deborah, Jet Propulsion Lab., California Inst. of Tech., USA; [2000]; 1p; In English; No Copyright; Avail: Issuing Activity; Abstract Only

Currently, endoscopic surgery uses single-mode fiber-bundles to obtain in vivo image information inside orifices of the body. This limits their use to the larger natural bodily orifices and to surgical procedures where there is plenty of room for manipulation. The knee joint, for example can be easily viewed with a fiber optic viewer, but joints in the finger cannot. However, there are a host of smaller orifices where fiber endoscopy would play an important role if a cost effective fiber probe were developed with small enough dimensions (is less than 250 microns). Examples of beneficiaries of micro-endoscopes are the treatment of the Eustatian tube of the middle ear, the breast ducts, tear ducts, coronary arteries, fallopian tubes, as well as the treatment of salivary duct parotid disease, and the neuro endoscopy of the ventricles and spinal canal. to solve this problem, this work describes an approach for recovering images from. tightly confined spaces using multimode fibers and analytically demonstrates that the concept is sound. The proof of concept draws upon earlier works that concentrated on image recovery after two-way transmission through a multimode fiber as well as work that demonstrated the recovery of images after one-way transmission through a multimode fiber. Both relied on generating a phase conjugated wavefront which was predistorted with the characteristics of the fiber. The described approach also relies on generating a phase conjugated wavefront, but utilizes two fibers to capture the image at some intermediate point (accessible by the fibers, but which is otherwise visually inaccessible).

Author

Imaging Techniques; Fiber Optics; Endoscopes; Coronary Circulation

20000074735 Communications Research Lab., Kashima Space Research Center, Kashima, Japan

Optical Linked VLBI in Japan

Nakajima, Junichi, Communications Research Lab., Japan; Koyama, Yasuhiro, Communications Research Lab., Japan; Kondo, Tetsuro, Communications Research Lab., Japan; Sekido, Mamoru, Communications Research Lab., Japan; Takahashi, Yukio, Communications Research Lab., Japan; Kawai, Eiji, Communications Research Lab., Japan; Okubo, Hiroshi, Communications Research Lab., Japan; Kiuchi, Hitoshi, Communications Research Lab., Japan; Kawaguchi, Noriyuki, National Astronomical Observatory, Japan; Kimura, Moritaka, National Astronomical Observatory, Japan; International VLBI Service for Geodesy and

Astrometry: 2000 General Meeting Proceedings; May 2000, pp. 334-337; In English; See also 20000074683; No Copyright; Avail: CASI; A01, Hardcopy; A04, Microfiche

Optical linked VLBI is the key technology to change historical VLBI style in this decade. It will not only achieve high sensitivity by the fast data transfer beyond magnetic tapes, but other features are also attractive for the VLBI operation. The optical linked data transfer without the media transport and its real-time correlation capability enables the quick look of observations. This means our global VLBI network will serve as a connected interferometer. Dynamic scheduling and realtime fringe checks eliminate independent fringe tests before observation and after standby. These features of optical linked VLBI minimize observation failure usually known long after observation and maximize telescope resources. Currently operated optical VLBI network KSP (Key Stone Project), GALAXY (Giga-bit Astronomical Large Array Xross-connect) and other experimental based optical VLBI in Japan are briefly summarized in this report.

Author

Very Long Base Interferometry; Optical Data Processing; Data Transmission; Interferometers; Real Time Operation

20000075211 NASA Ames Research Center, Moffett Field, CA USA

Stress, Aging and Thirst

Greenleaf, John E., NASA Ames Research Center, USA; Facts, Research and Intervention in Geriatrics, 1998: Hydration and Aging; [1998]; 7p; In English; ISBN 2-909342-52-2; Copyright; Avail: Issuing Activity

After growth during adolescence, total body water decreases progressively with aging from 65% of body weight to about 53% of body weight in the 70th decade; a majority of the loss occurs from the extracellular volume, from 42% to about 25%, respectively. Cellular volume also reaches equilibrium in the 70th decade at about 25% of body weight. Various stresses such as exercise, heat and altitude exposure, ad prior dehydration attenuate voluntary fluid intake (involuntary dehydration). Voluntary fluid intake appears to decrease with aging (involuntary dehydration in this sense aging can be considered as a stress. Kidney function and muscle mass (80% water) decrease somewhat with aging, and voluntary fluid intake (thirst) is also attenuated. Thirst is stimulated by increasing osmolality (hypernatremia) of the extracellular fluid and by decreased extracellular volume (mainly plasma volume) which act to increase intracellular fluid volume osmolality to activate drinking. The latter decreases fluid compartment osmolality which ' terminates drinking. However, this drinking mechanism seems to be attenuated with aging such that increasing plasma osmolality no longer stimulates fluid intake appropriately. Hypernatremia in the elderly has been associated all too frequently with greater incidence of bacterial infection and increased mortality. Involuntary dehydration can be overcome in young men by acclimation to an intermittent exercise-in-heat training program. Perhaps exercise training in the elderly would also increase voluntary fluid intake and increase muscle mass to enhance retention of water.

Author

Age Factor; Dehydration; Drinking; Aging (Biology); Gerontology; Water Loss

20000075545 Naval Health Research Center, San Diego, CA USA

A Proposal for Integrated Shipboard Alertness Management

Makeig, Scott; Neri, David F.; Mar. 13, 1996; 12p; In English

Report No.(s): AD-A378421; NHRC-96-4; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Under reduced manning policies now proposed for U.S. military naval vessels, continuity of on-duty crew alertness may become a major problem. We propose an integrated hardware and software system for fatigue and alertness management of military shipboard personnel, which would involve: (1) continuous, noninvasive monitoring of crew sleep history via wristband activity monitor; (2) dynamic work/rest scheduling software for optimizing crew schedules under changing missions and personnel demands; and (3) real time, objective alertness monitoring of on-duty crew in key work stations using electroencephalographic (EEG) signals recorded via noninvasive dry electrodes built into a cap or audio headset. The system would allow commanders to make operational decisions based on objective knowledge of their crew's state of fatigue and alertness, to maximize human-system efficiency and safety.

DTIC

Electroencephalography; Sleep Deprivation; Computer Programs; Fatigue Life; Real Time Operation; Ships

20000075722 Naval Health Research Center, San Diego, CA USA

An Epidemiologic Study of the Association Between Patterns of Physical Training and Musculoskeletal Injuries *Final Report, 1994-1995*

Almeida, Sandra A.; Williams, Karen M.; Shaffer, Richard S.; Brodine, Stephanie K.; Jan. 1998; 28p; In English

Report No.(s): AD-A378312; NHRC-96-32; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This study identified rates of diagnosis-specific musculoskeletal injuries in USA Marine Corps (USMC) recruits, and examined the association between patterns of physical training and these injuries. Subjects were 1,296 randomly selected USMC male recruits, ages 17 to 28 years, who reported to Marine Corps Recruit Depot (MCRD) San Diego for boot camp training between January 12 and September 14, 1993. Recruits were followed prospectively through 12 weeks of training for injury outcomes. Weekly volumes and types of vigorous physical training were correlated with injury patterns. The overall injury rate was 39.6%, with 82% of injuries occurring in the lower extremities. Overuse injuries accounted for 78% of the diagnoses. The most frequent site of injury was the ankle/foot region (34.3% injuries), followed by the knee (28.1%). Ankle sprains (6.2%, n = 1,143), iliotibial band syndrome (5.3%, n = 1,143), and stress fractures (4.0%, n = 1,296) were the most common diagnoses. The highest rates of injury were reported during the first 3 weeks of training and during weeks 8,10, and 11. These weeks included high total volumes of vigorous physical training and the greatest number of hours of running and military marching.

DTIC

Injuries; Musculoskeletal System; Physical Fitness; Epidemiology

20000075965 Naval Health Research Center, San Diego, CA USA

Limits of Tolerance to Hypothermia Final Report

Pozos, R. S.; Iaizzo, P. A.; Danzl, D. F.; Mills, W. J.; Aug. 09, 1993; 57p; In English

Report No.(s): AD-A378275; NHRC-93-15; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

With the advent of sophisticated rewarming techniques, physiologic systems demonstrate great tolerance to hypothermia. Organs can be cooled, and in some cases frozen, leading to a decrease in metabolic demands and then rewarmed with little or no long-term damage. Not all cases of hypothermia are reversed with rewarming. The major challenge for extending the limits of tolerance to hypothermia is to ascertain the fundamental mechanisms that are unleashed upon rewarming. The microvasculature remains the key site for extending human tolerance to hypothermia. The currently favored hypothesis for frostbite-induced damage is that free radicals are released by reperfusion that subsequently alter vascular tone. Eventually, these changes cause failure of the microcirculation and endothelial cell damage, resulting in thrombosis and necrosis. It is probable that the same cascade of events that occurs in frostbite also occurs during rewarming of the hypothermic patient. Predicting which system will fail upon rewarming is difficult since in many cases the hypothermia is secondary to some underlying pathology. This review will focus on two aspects of tolerance to the cold: 1) the physiologic effects that occur during hypothermia, and 2) the role various forms of rewarming play in reversing hypothermia.

DTIC

Human Tolerances; Hypothermia; Physiological Effects; Free Radicals; Frostbite

20000076642 NASA Langley Research Center, Hampton, VA USA

Aerospace Medicine and Biology: A Continuing Bibliography With Indexes, Supplement 502

July 2000; 45p; In English

Report No.(s): NASA/SP-1999-7011/SUPPL502; NAS 1.21:7011/SUPPL502; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This supplemental issue of *Aerospace Medicine and Biology, A Continuing Bibliography with Indexes* (NASA/SP-2000-7011) lists reports, articles, and other documents recently announced in the NASA STI Database. In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which humans are subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Applied research receives the most emphasis, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. Each entry in the publication consists of a standard bibliographic citation accompanied, in most cases, by an abstract. Two indexes-subject and author are included after the abstract section.

CASI

Aerospace Medicine; Bibliographies; Exobiology; Bioastronautics; Biological Effects; Indexes (Documentation); Pharmacology

20000076825 Institute of Space Medico-Engineering, Beijing, China

Space Medicine and Medical Engineering (Hangtian Yixue yu Yixue Gongcheng), Volume 13, No. 1, February 2000 Space Medicine and Medical Engineering

Feb. 2000; 88p; In Mixed

Report No.(s): PB2000-106338; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

Topics discussed are: Effect of Total Flavonoids of Hippophae Rhamnoides on Contractile Mechanics and Calcium Transfer in Stretched Myocyte (in English); Effects of Rotating-table Simulated 'Push-Pull Maneuver' on Cerebral Circulation Function; Material Selection and Structural Design of Simulated Space Module for Field; Effects of Acute Hypobaric Hypoxia on the Distribution of Somatostatin Contents in lower Gastrointestinal Tract of Rats; Measurement and Evaluation of Visual Index in VDT Operators under Multi-User System; Weightlessness and Heat Stress on Astronauts; and Chinese Science Citation Database (CSCD) Fulfilled and Made in Use.

NTIS

Aerospace Medicine; Weightlessness; Biometrics

20000076826 Institute of Space Medico-Engineering, Beijing, China

Space Medicine and Medical Engineering (Hangtian Yixue yu Yixue Gongcheng), Volume 12, No. 5, October 1999

Wei, J.; Oct. 1999; 88p; In Mixed

Report No.(s): PB2000-106337; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

Topics discussed are: Analysis of Heart Rate Variability during Parallel Swinging; Effects of Tea Polyphenols on Microcirculation and Antioxidation in Aircrew; Analysis of Mass Optimization of Manned Spacecraft ECLSS Thermo-hydraulic Network; Effect of Extremity Cuffs as a Countermeasure against the Cardiovascular Deconditioning during 21 d Heat-down Bedrest; Temperature Environment and the Heat Exchange of Astronaut in the Emergency Landing Areas; and Mechanisms and Detection of G-induced Loss of Consciousness.

NTIS

Aerospace Medicine; Biometrics; Weightlessness

20000078371 Naval Air Warfare Center, Aircraft Div., Patuxent River, MD USA

Human Tolerance to Acceleration Loads Generated in High-Performance Helicopters

Shender, Barry S.; Jan. 2000; 43p; In English

Report No.(s): AD-A378150; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The risk to helicopter aircrew of acceleration stress was assessed by investigating the human physiologic response to transitions from -1 Gz (push) to +4.5 Gz (pull) loads. Nine volunteers participated in a study conducted at the Veridian Operations Centrifuge Facility in Warminster, PA. A 1-hr mission scenario consisting of nine helicopter maneuvers, based on in-flight G measurements (push-pull mission, PPM), simulated both current (CM: .0.2 to +3.3 Gz) and projected future platform capabilities (FM: -1 to +4.5 Gz). Measurements included blood pressure, heart rate (FIR), loss of vision, and subjective fatigue. Visual decrements were minimal during CM while muscular tensing was required to avoid blackout during FM. Light loss typically occurred during the transition from -Gz to +Gz. Within the scope of these tests, subjects tolerated the range of Gz-stresses associated with current USN rotary wing platforms. When subjected to FM G-loads (typical of current USA platforms), cardiovascular stress significantly increased, Gz tolerance dropped as much as 1.2 G, and HR increased as much as 67 bpm. Cardiovascular changes were significantly greater during FM PPM relative to GM. Four subjects reported Almost-Loss of Consciousness symptoms during FM. While G-stress experienced by aircrew generated by current helicopters does not appear to present a high risk, 6 awareness training is recommended to reduce risks to aircrew exposed to G-loads generated by more aggressive helicopters. Future studies are required to determine the impact of longer mission times and dehydration.

DTIC

Helicopters; Human Reactions; Human Tolerances; Flight Crews; Physiological Effects; Acceleration Tolerance; Flight Simulation

20000080068 Civil Aeromedical Inst., Oklahoma City, OK USA

Gender Differences in a Refractive Surgery Population of Civilian Aviators *Final Report*

Nakagawara, Van B., Civil Aeromedical Inst., USA; Montgomery, Ronald W., Civil Aeromedical Inst., USA; July 2000; 16p; In English

Contract(s)/Grant(s): FAA-AM-A-99-TOX-203

Report No.(s): DOT/FAA/AM-00/23; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Refractive surgical procedures performed in the USA have increased in recent years and continued growth is projected. Postoperative side effects can affect the quality of vision and may be unacceptable in a cockpit environment. The scientific literature suggests certain females (pregnant, menopausal, elderly) are more likely to experience complications and have less than

optimal visual performance after refractive surgery. This study reviews the civil aeromedical experience with refractive surgery by gender.

Author

Surgery; Sex Factor; Females; Males; Vision

2000080157 NASA Ames Research Center, Moffett Field, CA USA

Capillary Pressure Balance with Repeated Head-Up Tilt in Humans

Hinghofer-Szalkay, H. G., Austrian Society for Aerospace Medicine, Austria; Greenleaf, J. F., NASA Ames Research Center, USA; 1995; 1p; In English; No Copyright; Avail: Issuing Activity; Abstract Only

We measured blood density (BD), plasma density (PD) and hematocrit (Ht) during repeated 70 deg head-up tilt (HUT) consisting of a pre-drink period with two supine (P and P3) and two HUT (P2 and P4) phases of 45 min each. At the end of P4 test subjects (N=8) drank 10 ml/kg body weight of isotonic (290 mOsm/kg) sodium chloride (ISO) or hypotonic (is less than 10 mOsm/kg) unsweetened us (HYP), or nothing (control: CON). The following periods continued the supine (P5, P7) / upright (P6) sequence. Mass density of plasma and whole blood using a "mechanical oscillation" technique were measured from ear lobe blood. Tilting altered (pis less than 0.001) BD, PD, and Ht in all consecutive Phases. BD and PD were different (pis less than 0.05) between CON, HYP, and ISO Phases 6 and 7. The computed mass density of fluid (FD), which moved between intra- and extravascular compartments, averaged 1008 g/l and was the same in any conditions. In the non-drink treatment (P3, P5, P7), supine PV steadily decreased when compared to P1. Tilt-induced PV shifts ranged from 9.7 to 16.7% when compared to PV du. ring the respective previous Phases. After drinking, PV increased above CON values at the end of Phase 7 by 12.9% with ISO, and by 6.6% with HYP. Progressive hemoconcentration, occurred during non-drink supine; isotonic saline ingestion increased supine PV a control level but did not stop or reverse the decrease of upright hemoconcentration. Upright density values were not slowed with repeated upright tilting; decreased fluid loss occurred in consecutive upright periods. Upright capillary pressure balance was achieved with diminished plasma volume loss during repeated tilting.

Author

Blood Plasma; Hematocrit; Body Fluids; Head Up Tilt; Bioastronautics; Hemodynamic Responses; Blood Circulation; Blood Volume

2000080158 NASA Ames Research Center, Moffett Field, CA USA

Time Course and Variability of Polycythemic Response in Men at High Altitude

Grover, R. F., NASA Ames Research Center, USA; Seiland, M., NASA Ames Research Center, USA; McCullough, R. G., NASA Ames Research Center, USA; Greenleaf, J. E., NASA Ames Research Center, USA; Dahms, T. E., NASA Ames Research Center, USA; Wolfel, E., NASA Ames Research Center, USA; Reeves, J. T., NASA Ames Research Center, USA; [2000]; 1p; In English; No Copyright; Avail: Issuing Activity; Abstract Only

Ten young men were exposed to 4,300 m (PB 460 Torr) for three weeks. Plasma volume (PV, Evans Blue dye), and blood volume (BV, carbon monoxide) measured simultaneously, and red cell volume (RCV) calculated from hematocrit, were determined twice at sea level and after 9-11 and 19-20 days at high altitude. After 19-20 days, half the subjects increased RCV +19.4 +/- 1.8% (pis less than 0.001); the other 5 subjects had no significant change in RCV. All 10 subjects had a sustained decrease in PV (-16.2 +/- 1.9%, pis less than 0.05) at altitude. Consequently, compared with sea level values, BV was unchanged (-3.1 +/- 1.8%) in the group with increased RCV, but BV decreased significantly (-12.2 +/- 1.4%, pis less than 0.05) in the other group. Variability in RCV response was not explained by differences, in hypoxemic stimulus or the erythropoietin and reticulocyte responses. Since RCV reflects the balance between red cell, production and destruction, accelerated red cell destruction may have occurred in those individuals with no net change in RCV.

Author

Blood Volume; Erythrocytes; High Altitude; Hematopoietic System; Blood Cells; Hemodynamic Responses; Males

2000080160 NASA Ames Research Center, Moffett Field, CA USA

Hypervolemia During Drinking of ISO and Hypertonic Fluids by Men at Rest and Exercise

Greenleaf, J. E., NASA Ames Research Center, USA; Looft-Wilson, R., NASA Ames Research Center, USA; Wisherd, J. L., NASA Ames Research Center, USA; Fung, P. P., NASA Ames Research Center, USA; Erti, A. C., NASA Ames Research Center, USA; Jackson, C. G. R., NASA Ames Research Center, USA; Barnes, P. R., NASA Ames Research Center, USA; Wong, L. G., NASA Ames Research Center, USA; 1994; 1p; In English; No Copyright; Avail: Issuing Activity; Abstract Only

To test the hypothesis that drink composition is more important than osmolality (osm) for maintaining and increasing plasma vol. (PV, hypervolemia) at rest and exercise (21.8C Tdb, 50% rh), 6 men (22-39 yr) underwent six treatments while sitting for 90 min (0.39 l/min) followed by 70 min of sitting ergometer exercise (2.08 l/min, 70%vO2 peak). Resting, intermittent drinking

(10 ml/kg, 768 ml) beverages were: P1 (20 mEq Na⁺, 365 mosmol/kg), P2 (40 mEq Na⁺, 791 mosm), P2G (40 mEq Na⁺, 80 ml glycerol, 1.392 mosm), AA (157 mEq Na⁺, 253 mosm), and O1 and O2 (nothing). The exercise drink (10 ml/kg, 768 ml) was P1 for all experiments, except O2 (nothing). Resting % delta PV (Hb-Hct) increased (Pis less than 0.05) by 3-6% only with P2 and AA, respectively, Exercise % delta PV was + 1 to + 3% (NS) with AA, -6% to 0% (KS) with P1, P2, P2G, and O1, and 8% to -5% (Pis less than 0.05) with O2- Thus, AA with 157 mEq Na⁺ and the lowest osmolality maintained PV at rest and exercise, while the other beverages with low Na⁺ and higher osmolality (365 to 1.382 mosm) did not.

Author

Hypervolemia; Males; Physical Exercise; Drinking; Osmosis; Hemodynamic Responses

20000080161 NASA Ames Research Center, Moffett Field, CA USA

Submaximal Exercise VO₂ and Q During 30-Day 6 degree Head-Down Bed Rest with Isotonic and Isokinetic Exercise Training

Greenleaf, J. E., NASA Ames Research Center, USA; Bernauer, E. M., NASA Ames Research Center, USA; Erti, A. C., NASA Ames Research Center, USA; 1995; 1p; In English; No Copyright; Avail: Issuing Activity; Abstract Only

Submaximal exercise (61±3% peak VO₂) metabolism was measured before (AC day-2) and on bed rest day 4, 11, and 25 in 19 healthy men (32-42 yr) allocated into no exercise (NOE, N=5) control, and isotonic exercise (ITE, N=7) and isokinetic exercise (IKE, N=7) training groups. Training was conducting supine for two 30-min periods/d for 6 d/wk: ITE was 60-90% peak VO₂: IKE was peak knee flexion-extension at 100 deg/s. Supine submaximal exercise decreased significantly (*pis less than 0.05) by 10.3%, with ITE and by 7.3%* with IKE; similar to the submaximal cardiac output (Q) change of -14.5%* (ITE) and -20.3%* (IKE), but different from change in peak VO₂ (+1.4% with ITE and - 10.2%, with IKE) and plasma volume of -3.7% (ITE) and - 18.0% * (IKE). Thus, reduction of submaximal VO₂ during prolonged bed rest appears to respond to submaximal Q but is not related to change in peak VO₂ or plasma volume.

Author

Males; Physical Exercise; Bed Rest; Head Down Tilt; Hemodynamic Responses

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BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

20000070852 Civil Aeromedical Inst., Oklahoma City, OK USA

Age and Attitudes in the Air Traffic Control Specialist Workforce: An Initial Assessment *Final Report*

Thompson, Richard C., Civil Aeromedical Inst., USA; Bailey, Lawrence L., Civil Aeromedical Inst., USA; May 2000; 14p; In English

Contract(s)/Grant(s): AM-B-99-HRR-516

Report No.(s): DOT/FAA/AM-00/17; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The present study examines the relationships between air traffic control specialist age, after covarying job tenure, with perceptions of job satisfaction, quality of work life, organizational commitment, and supervisory fairness. The presence of a relationship and the shape of the relationship are examined for four categories of controllers based on air traffic option or work setting (i.e., working in an enroute, flight service stations, Level 1 to 3 or level 4 or 5 terminal (towers and tracons)). The results suggest that there is a small linear relationship between age and attitudes. Similar patterns have been found in age research in other work settings. There are some differences in the shape of the age function based on air traffic option; these differences account for minimal variance. It may be fruitful to develop a more focused study where age is measured as a continuous variable instead of using age categories, which may have masked some differences found in past research. In addition, future research may consider examining the age and attitudes relationships using international controllers to determine if there are cultural differences in the relationships found.

Author

Age Factor; Air Traffic Controllers (Personnel); Organizations; Personnel Management; Human Relations; Employee Relations

20000072432 Institute for Human Factors TNO, Soesterberg, Netherlands

Pilot Studies on the Freezing Illusion *Interim Report Pilot Studies Naar de Zgn. Bevries-Illusie*

Wertheim, A. H., Institute for Human Factors TNO, Netherlands; Feb. 14, 2000; 25p; In English

Contract(s)/Grant(s): TNO Proj. 789.3; B99-043

Report No.(s): TD-00-0112; TM-00-B001; Copyright; Avail: Issuing Activity

In a number of pilot studies the freezing illusion (a grating, moving on a monitor, appears to 'freeze' on the monitor when that monitor itself is moved in the opposite direction; see Mesland en Wertheim, 1997) was investigated. The hypothesis was put forward that it may be a special case of the Pavard and Berthoz effect (during head- or ego-movements constant motion of a large visual pattern relative to the observers head appears to "freeze" in front of the head; see Pavard en Berthoz, 1977), meaning that both have a common denominator: the presence of a reference signal within the visual system (reference signals inform the visual system about self movements to enable a correct interpretation of retinal image motion). The pilot studies suggest that this hypothesis is incorrect and that the two phenomena seem to be of a different nature. They suggest that there is no need for a further test of this particular explanation of the Freezing illusion. A different explanation is, however, still lacking. On the other hand, the data support the opposite claim (Wertheim, 1994) that reference signals have no effect on the perception of relative motion between objects with respect to each other.

Author

Image Motion Compensation; Head Movement; Visual Signals; Retinal Images

20000073287 NASA Johnson Space Center, Houston, TX USA

Predictors of Behavior and Performance in Extreme Environments: The Antarctic Space Analogue Program

Palinkas, Lawrence A., California Univ., San Diego, USA; Gunderson, E K. Eric, Naval Health Research Center, USA; Holland, A. W., NASA Johnson Space Center, USA; Miller, Christopher, California Univ., San Diego, USA; Johnson, Jeffrey C., East Carolina Univ., USA; Aviation, Space, and Environmental Medicine; June 2000; Volume 71, No. 6, pp. 619-625; In English Contract(s)/Grant(s): NAG5-4571; Copyright; Avail: Issuing Activity

To determine which, if any, characteristics should be incorporated into a select-in approach to screening personnel for long-duration spaceflight, we examined the influence of crewmember social/ demographic characteristics, personality traits, interpersonal needs, and characteristics of station physical environments on performance measures in 657 American men who spent an austral winter in Antarctica between 1963 and 1974. During screening, subjects completed a Personal History Questionnaire which obtained information on social and demographic characteristics, the Deep Freeze Opinion Survey which assessed 5 different personality traits, and the Fundamental Interpersonal Relations Orientation-Behavior (FIRO-B) Scale which measured 6 dimensions of interpersonal needs. Station environment included measures of crew size and severity of physical environment. Performance was assessed on the basis of combined peer-supervisor evaluations of overall performance, peer nominations of fellow crewmembers who made ideal winter-over candidates, and self-reported depressive symptoms. Social/demographic characteristics, personality traits, interpersonal needs, and characteristics of station environments collectively accounted for 9-17% of the variance in performance measures. The following characteristics were significant independent predictors of more than one performance measure: military service, low levels of neuroticism, extraversion and conscientiousness, and a low desire for affection from others. These results represent an important first step in the development of select-in criteria for personnel on long-duration missions in space and other extreme environments. These criteria must take into consideration the characteristics of the environment and the limitations they place on meeting needs for interpersonal relations and task performance, as well as the characteristics of the individuals and groups who live and work in these environments.

Author

Antarctic Regions; Human Performance; Human Relations; Performance Prediction; Personality; Personnel; Psychology; Psychological Effects; Human Reactions

20000075969 Naval Postgraduate School, Monterey, CA USA

An Interactive Virtual Environment for Training Map-Reading Skill in Helicopter Pilots

McLean, Timothy D.; Sep. 1999; 121p; In English

Report No.(s): AD-A378330; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Currently, Student Naval Aviators are trained to interpret 1:50,000 scale contour maps by watching VHS videotapes. These tapes show a helicopter moving about twice its normal speed over desert terrain. Primarily due to the lack of interactivity in these videos, students often make mistakes very early in the videotaped flight. The helicopter does not stop until the tape is over, hence, the training evolution quickly becomes useless because students usually make mistakes during the first minute of the tape and are unable to recover or to learn from those mistakes. Based on a previous study at the Naval Postgraduate School, a training system that utilizes virtual environment technology was developed that is compliant with the Information for the 21st Century (IT-21) initiative. The system was built using a Windows NT / Intel (Wintel) based computer along with three 24-inch monitors to train the tasks of map interpretation and terrain association. This desktop system was fielded at Helicopter Antisubmarine Squadron 10 (HS-10) for experimentation. Results of this experiment indicate that student pilots who received VE training performed the

navigation task better in the helicopter than students who received only conventional training. Also, an IT-21 Wintel based computer is capable of rendering a graphically intensive multi-monitor application at frame rates suitable for training.

DTIC

Aircraft Pilots; Air Navigation; Virtual Reality; Computer Assisted Instruction; Pilot Training

20000080098 NASA Langley Research Center, Hampton, VA USA

Pilot Biofeedback Training in the Cognitive Awareness Training Study (CATS)

Uenking, M., NASA Langley Research Center, USA; [2000]; 8p; In English; Sponsored by American Inst. of Aeronautics and Astronautics, USA

Report No.(s): AIAA Paper 2000-4074; Copyright Waived; Avail: CASI; A02, Hardcopy; A01, Microfiche

One of the ongoing problems that pilots face today is a diminished state of awareness such as boredom, sleepiness, or fatigue during cruise conditions that could result in various pilot errors. This study utilized a cognitive training exercise to sharpen the pilot's awareness during simulated flight thereby providing them with a means to overcome these diminished states of awareness. This study utilizes psychophysiological methods in an attempt to assess a pilot's state of awareness more directly. In turn, the pilots will be able to train themselves to recognize these states of awareness and be more mentally sharp during mundane tasks such as those experienced in cruise conditions. The use of these measurement tools may be beneficial for researchers working within the NASA Aviation Safety Program. This paper will provide the reader with some background information concerning the motivation for the study, a brief description of the experimental setup and design matrix, the dependent and independent variables that were employed, and some preliminary findings based on some of the subjective and objective data that was collected. These preliminary findings are of part of an ongoing study being conducted at the NASA Langley Research Center in Hampton, Virginia.

Author

Pilot Training; Aviation Psychology; Aircraft Pilots; Biofeedback; Flight Simulators; Training Devices

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human factors engineering; bionics, man-machine, life support, space suits and protective clothing. For related information see also 16 Space Transportation and 52 Aerospace Medicine..

20000072480 National Inst. of Standards and Technology, (BFR), Gaithersburg, MD USA

Estimates of Thermal Conductivity for Materials Used in Fire Fighters' Protective Clothing

Lawson, J. R.; Pinder, T. A.; May 2000; 30p; In English

Report No.(s): PB2000-105986; NISTIR-6512; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Fire fighters' protective clothing provides a limited amount of thermal protection from environmental exposures produced by fires. This level of thermal protection varies with the design, materials, construction, and fit of the protective garments. This report presents thermal conductivity data for nine materials used in fabricating fire fighters' protective clothing. These materials included outer shell fabrics, moisture barrier, thermal linear batting, and reflective trim. As a comparison, measurements were also made on a cotton duck fabric. The thermal conductivity of individual protective clothing materials was measured using the test procedure specified in ASTM C-518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of Heat Flow Meter Apparatus (1). Measurements producing estimates of thermal conductivity for single layers of materials were carried out at mean heat temperatures of 20 deg C (68 deg F), 48 C (118 F), 55 deg C (131 F), and 72 C (162 F). No visible physical changes were observed with any of the materials tested at these temperatures. Thermal conductivity estimates for materials used in the construction of fire fighters' protective clothing ranged from 0.034 W/mK to 0.136 W/mK over the range of temperatures addressed in the study. Generally, thermal conductivity values increased for all materials as mean test temperatures were increased.

NTIS

Estimates; Protective Clothing; Thermal Conductivity; Fire Fighting; Thermal Protection

20000072483 NASA Marshall Space Flight Center, Huntsville, AL USA

Living and Working in Space

Roman, Monserrate C., NASA Marshall Space Flight Center, USA; [2000]; 30p; In English; 2000 National Image, Inc., Training Conference and Convention, 6-11 Jun. 2000, Carolina, Puerto Rico; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document is a presentation about some of the challenges of living and working in space. The presentation shows slides of the Apollo 11 liftoff, Skylab in orbit, a Space Shuttle launch, and a slide of the International Space Station. It reviews the needs and effluents of the astronauts per day, and the Environmental Control and Life Support (ECLS) systems. It shows a flow diagram

of the Space Station Regenerative ECLS, which shows the various systems, and how they interact to control the environment and recycle the air, and water. There are other slides some of which show astronauts eating, brushing teeth, shaving, and sipping from a sip bottle while exercising.

CASI

Environmental Control; Life Support Systems; Water; Closed Ecological Systems; Oxygen Supply Equipment; Spacecraft Environments; Waste Management; Oxygen Production; Waste Disposal

20000072884 NASA Marshall Space Flight Center, Huntsville, AL USA

International Space Station Carbon Dioxide Removal Assembly Testing

Knox, James C., NASA Marshall Space Flight Center, USA; 2000; ISSN 0148-7191; 13p; In English; 30th; Environmental Systems, 10-13 Jul. 2000, Toulouse, France; Sponsored by Society of Automotive Engineers, Inc., USA

Report No.(s): 00ICES-234; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Performance testing of the International Space Station Carbon Dioxide Removal Assembly flight hardware in the USA Laboratory during 1999 is described. The CDRA exceeded carbon dioxide performance specifications and operated flawlessly. Data from this test is presented.

Author

Carbon Dioxide Removal; International Space Station; Performance Tests; Decontamination; Closed Ecological Systems; Exobiology; Spacecraft Environments; Spacecraft Equipment

20000074273 Naval Undersea Warfare Center, Newport, RI USA

Ultrasonic Disinfection of Water Suspensions of Escherichia Coli and Legionella Pneumophila

Evora, Victor F., Naval Undersea Warfare Center, USA; Kavarnos, George J., Thames Testing Lab., LLC, USA; Apr. 05, 1999; 18p; In English

Report No.(s): AD-A365444; TR-11.086; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

This report describes an experiment in which water samples inoculated with Escherichia (E) coli and Legionella (L) Pneumophila organisms were exposed to ultrasonic energy. It was found that treating the samples with pulses of ultrasound for at least 15 minutes at a 50% amplitude virtually eliminated the E. coli colonies. Longer exposure times were required to completely destroy L. pneumophila. Although the water samples experienced slight warming during the course of the ultrasonification, control experience on which the test samples were not exposed to ultrasound but simply warmed have supported the conclusion that the test organisms were destroyed by acoustic energy alone. The use of ultrasound as an applied and commercial technology for disinfecting water supplies is also discussed in the report. However, the mechanisms of cell destruction not yet fully understood, are left for the subject of a future publication.

Author

Antiseptics; Escherichia; Sound Waves; Ultrasonics; Antimicrobials and Antibacterials; Sterilization; Bactericides; Decontamination; Water Treatment

20000076818 Chief of Naval Development, Washington, DC USA

Joint Service Lightweight Integrated Suit Technology (JSLIST), Operational Requirements Document (ORD) Final Report

May 17, 2000; 32p; In English

Report No.(s): AD-A378165; ORD-556-86-00; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

During Operation Desert Storm (ODS), a major deficiency identified was the inability of U.S. forces to provide the warfighter with percutaneous protection against Nuclear, Biological, and Chemical (NBC) Warfare agents and Toxic Industrial Materials (TIMs). Current national military strategy specifies a worldwide force projection capability that requires U.S. forces to employ effective force protection measures against NBC threats. JSLIST will meet the Joint Chief's urgent need to enhance the survivability of U.S. forces. The JSLIST will provide the wearer with protection from the effects of NBC contaminants and TIMs in any form or state. The JSLIST will be an integrated ensemble consisting of a protective garment (with/without a hood), footwear and gloves; and be compatible with the protective mask currently in inventory and those in development.

DTIC

Protective Clothing; Chemical Warfare; Military Operations; Chemical Defense

20000080036 Management Sciences, Inc., Albuquerque, NM USA

Web Based Client/Server Interface for Part Task Training Final Report, Dec 1999-May 2000

Blemel, Peter A., Management Sciences, Inc., USA; Jun. 2000; 21p; In English

Contract(s)/Grant(s): N68335-00-C-0131

Report No.(s): AD-A378139; MS10007; NSWC-IHD-00001AF; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

This is the Phase I final report for a NAVAIR SBIR project to develop and commercialize web-based Collaborative Part Task Training (CPTT). The Navy has fielded many Part Task Trainers (PTT) that emulate a variety of aircrew Control Display Units (CDUs). These CDU Emulations (CDUEs) reflect unique Operational Flight Program (OFP) functionality for specific types of aircraft. The objective of each CDUE is to provide aircrew training using a man/machine interface that is representative of the aircraft. This project explored the potential of using the Internet to revolutionize the way the Navy provides part-task proficiency training. The project focused on developing concepts for ways to use the Internet to provide individual and cooperative Distance Part Task Training using virtual or real training equipment. The Phase I goal was to define a commercially viable multi-media virtual training environment for providing realistic training wherever and whenever needed.

DTIC

Client Server Systems; World Wide Web; Man Machine Systems; Tasks; Training Devices

55

EXO BIOLOGY

Includes astrobiology; planetary biology; and extraterrestrial life. For the biological effects of aerospace environments on humans see 52 Aerospace medicine; on animals and plants see 51 Life Sciences. For psychological and behavioral effects of aerospace environments see 53 Behavioral Science.

20000073302 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA

Different Approaches for Ensuring Performance/Reliability of Plastic Encapsulated Microcircuits (PEMs) in Space Applications

Gerke, R. David, Jet Propulsion Lab., California Inst. of Tech., USA; Sandor, Mike, Jet Propulsion Lab., California Inst. of Tech., USA; Agarwal, Shri, Jet Propulsion Lab., California Inst. of Tech., USA; Moor, Andrew F., Jet Propulsion Lab., California Inst. of Tech., USA; Cooper, Kim A., Jet Propulsion Lab., California Inst. of Tech., USA; [1999]; 23p; In English; 1999 Interpack Conference, 17 Jun. 1999, USA; Sponsored by American Society of Mechanical Engineers, USA; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This paper presents viewgraphs on Plastic Encapsulated Microcircuits (PEMs). Different approaches are addressed to ensure good performance and reliability of PEMs. The topics include: 1) Mitigating Risk; and 2) Program results.

CASI

Encapsulated Microcircuits; Technology Utilization; Plastics; Performance Tests; Reliability

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